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IDENTIFIERS	*Bacteria

ABSTRACT

This volume outlines the requirements and content of a second-year course in allied health occupations education that is intended to provide students with a practical understanding of the work done by medical laboratory technicians and technologists. Addressed in the individual units of the course are the following topics: the value of microbiology; the microscope; the protist, yeasts, molds, protozoa, bacteria, parasites, and viruses; environmental control of bacteria; hospital sanitary measures; methods for the destruction of bacteria; and anatomy and physiology. The first part of the volume sets forth standards pertaining to the primary objective of the course requirements. The bulk of the guide comprises a series of unit outlines in which behavioral objectives are presented together with an implementation plan and a list of lesson assignments. Concluding the volume are a sample training site plan and a sample student evaluation checklist. (MN)

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Middletown Public Schools

CURRICULUM STANDARDS

ALLIED HEALTH OCCUPATIONS II
MEDICAL LABORATORY ASSISTANT COMPONENT
STUDENT LEARNING GUIDE

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
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COURSE DESCRIPTION

COURSE TITLE : Allied Health Occupations II (Medical Laboratory Component)

OBJECTIVE : To provide student with a practical study of the work done by laboratory technicians and technologists and to acquire some basic laboratory skills.

DESIGNED FOR : A 12th grade student who wishes to examine possibilities of employment/further education in the medical laboratory field.

CONTENT : Topics covered include:

1. The value of Microbiology
2. The microscope
3. Protists, yeasts, molds, protozoa, bacteria, parasites, and viruses
4. Environmental control of bacteria
   Air, milk, food, water, soil, sewage
5. Hospital sanitary measures - vaccines, body defenses, immunity
6. Methods of destruction of bacteria
   Physical agents, chemical agents, chemotherapeutic agents
7. Anatomy and Physiology - Blood, cells, tissues, disease, nervous system, sensory system

DURATION : Two (2) semesters

PREREQUISITES: Allied Health I

COURSE REQUIREMENTS :

1. Students will bring required materials to class.
2. Homework assignments, quizzes, tests, examinations.
3. Students must wear uniform provided by the school for their clinical experience.

NOTE: The student will receive 1/2 credit for the first semester of Allied Health II. One full credit will be awarded for the second semester's work which includes approximately 50-60 hours of clinical experience at Middlesex Memorial Hospital and/or other clinical site.

LEARNING PACKET - MEDICAL LABORATORY ASSISTANT

The Medical Laboratory Assistant assists the Medical Technologists and technicians in outline laboratory tests and related work. The laboratory supervisor will identify and list the duties which the student will perform while under supervision in the clinical site.

This learning packet is to be used in conjunction with:

Texts: Ferris, Elvira B., and Fong, Elizabeth; Microbiology For Health Careers; Delmar
Sinmers, Louise; Diversified Health Occupations; Delmar
Memmler/Wood; The Human Body in Health and Disease; Lippincott
Morrison, Cornett, Tether, Gratz; Human Physiology; Holt, Rinehart, Winston

Library and other Resource Books:

Wittman; Basic Sciences for Health Careers; McGraw-Hill
Wittman and Thomas; Medical Laboratory Skills; McGraw-Hill

Film Strips:

Evaluation: Observation of Laboratory Techniques by instructor and clinical area supervisors
Unit Tests
Mid-term and final examinations
Daily evaluation and training site plans signed by technology personnel

This course will provide approximately 50 classes of Allied Health Occupations II, Core Curriculum, before beginning study on Medical Laboratory Assistant, 15 classes of instruction on introduction to Medical Laboratory Science (first semester), and 60 hours of Clinical experience in the medical laboratory at Middlesex Memorial Hospital/other agencies, infection control at hospital, Middletown Health Department, plus approximately 30 classes in the classroom during the second semester.

I. THE WORLD OF MICRO-ORGANISMS

A. The Value of Microbiology

The student will:

1. define the science of microbiology.
2. identify 3 basic health care prodedures used to prevent & control disease.
3. relate the contributions of scientists to the conquest of disease.

Spallanzani	Jenner
Pasteur	Koch
Dick	Flemming
Salk	Sabin
Van Leeuwenhoeh	

B. The Microscope

The student will:

1. identify the parts of the microscope and their functions.
2. demonstrate the use of the microscope by focusing on a prepared slide or object.

C. The Protist

The student will:

1. name the microorganisms which make up the 5 protist groups.
2. suggest some uses for algae.
3. give 3 examples of specific disease causing organisms.

IMPLEMENTATION PLAN

- Ferris, Elvira B. & Fong, Elizabeth
  Microbiology for Health Careers
  Delmar

- Microbiology for Health Careers

  Simmers, Louise
  Diversified Health Occupations
  Delmar

- Microbiology for Health Careers

  Make chart or poster for Allied Health Display

D. Yeasts

The student will:

1. explain the structure and types of yeast.
2. identify the beneficial and harmful activities of yeast.

E. Molds

The student will:

1. define mold and describe its compostition.
2. explain and provide examples of how molds affect a person's well-being.

F. Protozoa

The student will:

1. define the characteristics of protozoa and the nature of their activities.
2. name and describe some diseases caused by protozoa.

G. Bacteria

The student will:

1. describe a bacterial cell.
2. explain how bacterial may be observed.
3. give examples of bacteria which are beneficial to people and those which are harmful.

IMPLEMENTATION PLAN

- Ferris, Elvira B. & Fong, Elizabeth
  Microbiology for Health Careers
  Delmar

-Do microscopic exam of yeast.
Write out observation and conclusions.
Test Unit I

-Do and write out conclusions of Micro. exam of molds.

-Using library resources, prepare one page written reports to be shared with the class on maleria, ambeic dysentery, and Africal sleeping sickness.

-Do experiment pg. 39.
Write out observations and conclusions.

II. Parasites and Viruses

The student will:

1. describe the way a parasite obtains its nourishment for growth and development.
2. clarify cell structure and transmission of reckettsias.
3. indicate the difference between chamydias and viruses.
4. explain how viral infections occur, and the role of interferon.
5. identify the significan characteristics of viruses.

BACTERIA

A. The Structure and Behavior of Bacteria

The student will:

1. describe the size and shape and structure of bacterial cells.
2. detail the potential dangers of bacteria to human beings, and the sterilization techniques to prevent infection.

B. Favorable Environment for Bacterial Growth

The student will:

1. list conditions required by bacteria in order to grow.
2. explain the difference between aerobic and anaerobic bacteria.

IMPLEMENTATION PLAN

-Using library references, write and share with the class one page reports assigned by teacher on: Ticks and Rocky Mountain Spotted Fever, Tsetse fly and African Sleeping Sickness, Common House fly and Typhoid Fever or Dysentery, Aedes aegypti, mosquito and Yellow Fever.
Evaluation: Unit Test.

-Ferris, Elvia B. & Fong, Elizabeth
Microbiology for Health Careers
Delmar

-Write 2 page paper: No. 3 study question - How Health Care Professional can help provide an environment unfavorable to bacteria for the patient, both at home and in the hospital.

C. Growth and Reproduction of Bacteria

The student will:

1. describe how bacteria grow and multply.
2. explain the necessity for, and methods of, controlling the growth of bacteria.

I. MICRO-ORGANISMS--INFECTIONS AND IMMUNITIES

A. How Microorganisms Cause Infection

The student will:

1. name 4 ways in which bacteria may be transmitted by direct contact.
2. name 2 ways by indirect contact.
3. list 4 sources of entry into the body.
4. identify bodily secretions and excretions which contain bacteria.

B. Body Defenses

The student will provide a detailed explanation of six ways of body defenses.

C. Immunity

The student will:

1. explain what is meant by immunity and the 4 types of immunity.
2. define: antigen, autoimunity, hypersensitivity, toxin, toxoid

D. Vaccines and Immune Serums

IMPLEMENTATION PLAN

-Ferris, Elvira B. & Fong, Elizabeth
Microbiology for Health Careers
Delmar

Test Unit II.

-Write 1-1½ page report on Typhoid Mary Case. U.S. Government Control of Mosquitos when building Panama Canal.

-Project: Set up time and visit with school nurse (elementary) or city health clinic.

-Memmler/Wood
The Human Body in Health & Disease
Lippincott

pg. 279-286

-Ferris, Elvira B. & Fong, Elizabeth
Microbiology for Health Careers
Delmar

Unit Test

IV. METHODS OF DESTRUCTION OF BACTERIA

A. Physical Agents of Destruction

The student will discuss 6 means of destroying bacteria.

B. Chemical Agents

The student will:

1. describe how bacteria are destroyed by chemical means.
2. list 8 antiseptic and disinfectant preparations used by health care professionals.

C. Chemotherapeutic Agents

The student will identify the general characteristics and action of antibiotics and other chemotherapeutic agents.

ENVIRONMENTAL CONTROL OF BACTERIA

A. Air

The student will list 3 methods used for preventing the spread of airborne diseases.

B. Milk

The student will:

1. name the most common sources of contaminated milk.
2. identify the various means of avoiding milk contamination.
3. list 3 diseases transmitted from cows--through human or other contamination.
4. describe the 2 pasteurization methods.

IMPLEMENTATION PLAN

-Ferris, Elvira B. & Fong, Elizabeth
Microbiology for Health Careers
Delmar

Write out and give oral report - 2 pgs. on a germ-free research center.

Write one-page report on Waksman.

Unit test.

Do experiment on bacteria in milk, pg. 135-137

C. Food

The student will:

1. list the most common types and causes of food poisoning.
2. explain in detail how food poisoning can be prevented.

D. Water Soil Sewage

The student will explain how water can be made safe so that it will not be a source of infection.

VI. HOSPITAL SANITATION

A. Hospital Sanitary Measures

The student will:

1. explain the importance of practicing sanitary measures in the hospital.
2. identify the sources of infections which may occur in hospitals.
3. describe the methods of controlling infection within the hospital.

VII. ANATOMY AND PHYSIOLOGY

A. Cells, Tissues and Tumors

The student will:

1. define DNA, RNA, Membrane
2. list the various types of cells that are found in each of the 4 types of tissues.

IMPLEMENTATION PLAN

-Ferris, Elvira B. & fong, Elizabeth
Microbiology for Health Careers
Delmar

--Department of Health, Report on Local Sanitary Code for Prevention of Food Contamination.

-Unit V Test.

-Ferris, Elvira B. & Fong, Elizabeth
Microbiology for Health Careers
Delmar

-Unit VI Test.

-Memmler/Wood
The Human Body in Health and Disease
Lippincott

-Morrison, Cornett, Tether, Gratz
Human Physiology
winston

-Film:

Cornet
Cells, Tissues

B. Disease and Disease Producing Organs

The student will define the following:

disease	idiopathic	syndrome
etiology	epidemic	therapy
incidence	endemic	infection
acute	symptom	patogen
chronic	sign	diagnosis

C. Blood

The student will:

1. define the following blood studies:
   a. hematacrit/hemoglobin
   b. cell count
   c. differencial (smear)
   d. chemistry tests
   e. clotting time
   f. bleeding time
   g. platelet count
   h. sternal puncture
2. list the general functions of the blood.
   a. transports all materials required by the cells or discarded by them
   b. maintains transport of gasses concerned in respiration - O_2, CO_2
   c. foods are absorbed and transported around the body
   d. soluble wastes are removed from the cells and carried to organs of elimination
   e. glands put hormones into blood for transport
   f. maintainance of water content of tissues
   g. equalize the acid air base
3. list the blood components.

   fluid - plasma (55%)
   water, proteins, inorganic salts, nutritive materials, hormones, vitamins, enzymes, waste products

   solid - (45%)
   red blood corpuscles (erythrocytes), white blood corpuscles (leukocytes), blood platelets (thrombocytes)

IMPLEMENTATION PLAN

- Memmler/Wood
  The Human Body in Health & Disease
  Lippincott

- Morrison, Cornett
  Human Physiology
  Winston

4. list the roles played by:

   arteries, veins, and capillaries in the circulation of the blood.

5. distinguish between members of the following pairs of terms:

   a. intravascular fluid - intracellular fluid
   b. artery - vein
   c. atrium - ventrical
   d. plasma - corpuscle

6. describe the structure of an erythrocyte.

7. state the function of hemoglobin.

8. describe 3 different types of anemia.

9. define:

   a. leukemia
   b. leukopenia
   c. pus
   d. bone marrow

Medical Laboratory Aide Assignments

Unit	Topic	Assign.#	Assignments	Date Due
I	Microbiology		Read Microbiology for Health Careers, pg 1-3	
		34.	Write out study questions below: a. ½ page reports on 4 of the 8 scientists listed (Divide with class - see instructor) Include, along with contribution to Medical science, what they were working on/for and how the discovery happened. b. Bring in a newspaper or magazine article with a written, one page report on it - summarizing it to share with the class - on some aspect of medical research today. c. Write out assignment questions on pg. 4.	
	Microscope		Read Micro Text, pg 5-9	
		35.	Write out assignment questions 1 through 5. Read Diversified Health Occupations, pg. 214-216.	
		36.	Do workbook assignment sheet 8:1.	
	Protists		Read Micro Text, pg. 11-14	
		37.	Write out assignment questions 1 through 12, pg. 14,15.	
	Yeasts		Read Micro Text, pg. 16-18	
		38.	a. Write out observations and conclusions after doing yeast experiement. b. Assignment questions, 1 trough 6, pg. 20,21.	
	Molds		Read Micro Text, pg. 22-25	
		39.	a. Write out conclusions of micro examination of molds. b. Assignment q. 1-10, pg. 26,27.	

Assignments (Lab) 2

Unit	Topic	Assign. #	Assignments	Date Due
	Protozoa		Read Micro Text, pg. 28-33.	
		40.	Using library resources, prepare one page written reports to be shared with class on malaria, amebic dysentery and African sleeping sickness.	
		41.	Assign. questions 1-9, pg. 34,35.	
	Bacteria		Read Micro Text, pg. 36-39.	
			Experiment, pg. 39 (if able to do in lab) Write out observations and conclusions	
		42.	Assign. questions 1-10, pg. 42,43.	
	Parasites and Viruses		Read Micro Text, pg. 44-47	
		43.	Using library references, write and share with class, one page reports of 2 of the following (assigned by teacher) Ticks and Rocky Mountain Spotted Fever Tsetse fly and African Sleeping sickness Common house fly and typhoid fever or dysentery Aedes aegypti mosquito and yellow fever	
		44.	Write assign. questions 1-14, pg. 48,49	
II	Bacteria Structure and Behavior		Read Micro Text, pg. 55-59	
		45.	Write assign, questions 1-11, pg. 60-62	
	Environment for Bacterial Growth		Read Micro Text, pg. 63-65	
		46.	Write 2 page paper: How Health Care Professionals Can Help Provide an Environment Unfavorable to Bacteria for the Patient, Both at Home and in the Hospital.	
		47.	Write assign. questions 1-9, pg. 66,67.	

Unit	Topic	Assign.#	Assignments	Date Due
	Growth & Reproduction of bacteria		Read Micro Text, pg. 68 and 69.	
		48.	a. List methods of reproduction by organisms.	
			b. Assign. questions 1-5, pg. 70.	
III	How Microorganisms Cause Infection		Read Micro Text, pg. 74-77	
		49.	a. Write 1-1½ page report on Typhoid Mary case.	
			b. Write 1-1½ page report on U.S. Government control of mosquitos.	
		50.	Assign. questions 1-12, pg 78 & 79.	
	Body Defenses		Read Micro Text, pg 80-85	
		51.	Assign. questions 1-24, pg. 85-88	
	Immunity		Read Micro Text, pg 89-91	
		52.	Visit with school nurse (elementary, secondary or health clinic) Report 1-2 pages - What they do - why? How does it benefit the school child? How does it benefit the community?	
		53.	Assign. questions 1-25, pg. 91-94.	
			Read Memmler/Wood - The Human Body in Health and Disease, pg. 279-286.	
		54	Write out questions 1-5,8,9,11,14 on pg. 287.	
	Vaccines		Read Micro Text, pg. 95-97	
		55.	Write all study questions pg 97.98 and Assign. questions 1-10, pg 98 & 99.	
IV	Physical Agents of Destruction		Read Micro Text, pg. 104-109	
		56.	Write out and give oral report, 1-2 pages, on a germ-free life research center. (#6 study question, pg. 108)	

Unit	Topic	Assign.#	Assignments	Date Due
	Physical Agents of Destruction (cont.)	57.	Assign. questions 1-20, pg. 109-111.	
	Chemical Agent of Destruction		Read Micro Text, pg. 112-114	
		58.	Write - Study question #4, pg. 115 - Dangers involved in using chemical solutions which are stronger than recommended, specifically iodine, phenol, and bichloride of mercury.	
		59.	Assign. questions 1-7, pg 116 & 117.	
	Chemotherapeutic Agents		Read Micro Text, pg. 118-121	
		60.	Write a 1 page report on Waksman.	
		61.	Assign. questions 1-8, pg. 123 & 124.	
			UNIT IV TEST	
V.	Environmental Control Air		Read Micro Text, pg. 129-130	
		62.	Assign. questions 1-14, pg. 131 & 132.	
	Milk		Read Micro Text, pg. 133-135	
		63.	Do experiment on bacteria in milk, pg. 135-137 :Write our conclusions.	
		64.	Assign. questions 1-14, pg. 137-139.	
	Food		Read Micro Text, pg. 140-142	
		65.	Study question #7, 1-2 page report on local Dept. of Health Sanitary Code for Prevention of Food Contamination.	
		66.	Assign. questions 1-9, pg. 145 & 146.	

Unit	Topic	Assign. #	Assignments	Date Due
	Water Soil Sewage		Read Micro Text, pg. 147-149	
		67.	Assign questions 1-14, pg. 151 & 152.	
			UNIT V TEST	
VI.	Hospital Sanitary Measures		Read Micro Text, pg. 156-159	
		68.	Write study questions 2 & 3, pg. 159. " Assign, questions 1-8, pg. 160.	
			QUIZ UNIT VI	
VII.	Cells Tissues Tumors		Read Memmler/Wood, The Human Body in Health and Disease, pg. 35-50	
		69.	Assign. questions 1-23, pg. 51.	
			Read Human Physiology, pg. 43-53.	
		70.	Write questions pg. 53 - Group A. 1-10 Group B. 2,3,5, & 6.	
	Disease Producing Organisms		Read Human Body in Health and Disease, pg. 11-24	
		71.	Assign ques. 1-15, pg. 25 & 26.	
			Read Human Physiology, pg. 24-43.	
		72.	Assign ques. - Group A 1-10, Group B 1 & 6, pg. 42. Know vocabulary.	
	Blood		Read Human Body, pg. 59-71	
		73.	Assign. ques., pg. 73.	
			Read Human Physiology, pg. 298-321	
		74.	Write out vocab., pg. 307. Write ques. - Group A abd B pg. 308 Group B 1-6, pg 321.	
	Sex Free Career Choice			

What they are and how to use them.

Training plans are methods by which the instructor correlates the classroom and clinical experiences. The time required for a student to become competent in each task may vary, but average times should be provided for each task.

A time sheet must be completed by the student at the end of each day. Each student must record the skills learned/utilized and the time spent on each skill. This sheet is to be kept at the student's training site and, when completed, turned in to the instructor.

The on-site training plan should be completed by the on-site trainer or instructor and must be kept at the training site. When a student has successfully completed each competency, the on-site trainer will sign the student off, verifying their performance. The student will be responsible for making sure that they have completed each task and that they have the on-site trainer's signature. A copy of the completed training plans will be given to the student at the end of the program as a reference and guide.

TRAINING PLAN

Student _____ Date _____

Course Title _____

Training Job Title _____

Training Site	School
Facility/Office _____	Name _____
Address _____	Administrator _____
_____	Phone _____
Phone _____	Parent's Name _____
Contact Person _____	Emer. Phone No. _____
Title _____	Teacher's Name _____
Phone _____	Phone _____

Student's Training site hours from _____ AM/PM to _____ AM/PM

Department/Unit/Ward _____

Sub-department _____

The tasks listed are those which the student is expected to be able to perform to the satisfaction of the on-site trainer/staff.

_____ _____
On-site Trainer Student

_____ _____
Instructor Date

Student: _____

Comments:

The above signatures certify that _____

has successfully performed the skills listed under the direct supervision of the designated on-site trainer and/or the instructor of record.

Date of completion of entire training plan: _____

MEDICAL LABORATORY ASSISTANT

Middlesex Memorial Hospital Laboratory

Student _____ Supervisor _____

TASKS	Training Time Spent	Date Competency Level Achieved	On-site Trainer Signature
A. SPECIMEN PROCESSING			
1. Checks identification on specimen container with test request card			
2. Processes specimen for all tests requested			
3. Selects correct media as specified by planting procedure			
4. Labels all media to be inoculated according to procedure prior to inoculation			
5. Handles inoculating loop with relative ease			
6. Places media in appropriate incubator according to planting procedure			
7. Completes one specimen before beginning next culture			
8. Demonstrates proficiency in processing the following specimens: a) urine b) throat swab c) sputum			

9. Obrains discrete, isolated colonies			
10. Keeps work area clean and neat			
11. Restocks supplies			
12. Observes laboratory safety procedures: Wears lab coat Turns off burner when not in use Keeps hands and pencils away from face Washes hands before leaving lab			

MEDICAL LABORATORY ASSISTANT

Middlesex Memorial Hospital Laboratory
- Page 3 -

Student _____ Supervisor _____

TASKS	Training Time Spent	Date Competency Level Achieved	On-site Trainer Signature
Gram Staining and Blood Culture			
1. Performs Gram stain according to laboratory procedure			
2. Obtains correct gram reaction for cells and bacteria			
3. Identifies: a) epitheial cell b) nuetrophil c) rod d) coccus			
4. Differentiates Gram positive from Gram negative			
5. Describes the principle of the radiometric system for detection of bacterimia			
6. Describes purpose and importance of blood cultures			
7. Keeps work area clean and neat			

8. Restocks supplies			
9. Observes laboratory safety procedures: Wears lab coat Turns off burner when not in use Keeps hands and pencils away from face Washes hands before leaving lab			

MEDICAL LABORATORY ASSISTANT

Middlesex Memorial Hospital Laboratory

Student _____ Supervisor _____

TASKS	Training Time Spent	Date Competency Level Achieved	On-site Trainer Signature
C. Plate Reading			
1. Recognize Beta-hemolytic strep in throat cultures			
2. Describe the principle of drug susceptibility testing			
3. Discuss importance of rapid methods for patient management			
4. Keeps work area clean and neat			
5. Restocks supplies			
6. Observes laboratory safety procedures: Wears lab coat Turns off burner when not in use Keeps hands and pencils away from face Washes hands before leaving lab			

MEDICAL LABORATORY ASSISTANT

Middlesex Memorial Hospital Laboratory

Student _____ Supervisor _____

D. Tb/Mycology	Training Time Spent	Date Competency Level Achieved	On-site Trainer Signature
1. Discuss importance of a) limited access room			
b) use of Biogard hood c) unique safety procedures			
2. Explain why special strains are used for Mycobacteria.			
3. Name 3 differences in culture procedure for Mycobacteria as compared to common bacterial pathogens.			

Student _____ Supervisor _____

E. INFECTION CONTROL	Training Time Spent	Date Competency Level Achieved	On-site Trainer Signature
1. Describe relationship between Microbiology and hospital Infection Control Department			
2. Define nosocomial or hospital assiciated infection and give one example observed on rounds			

Instrumentation and Rapid Methods			
1. Briefly describe the influence of automation on a) laboratory workload			
b) patient care			